Partial Scan only of Performance Characteristics from XB-19 Report found in Naval Historical Center's Files

4803

REPORT NO. 4803

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DATE July 18, 1942

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WAR DEPARTMENT
AIR CORPS
MATERIEL DIVISION
DAYTON, OHIO

AIR CORPS TECHNICAL REPORT

No. 4803

DEVELOPMENT, TEST AND ACCEPTANCE OF
DOUGLAS XB-19 AIRPLANE, AAF NO. 38-471

Title

BY
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Approved:
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By direction of the Chief of the Materiel Division.
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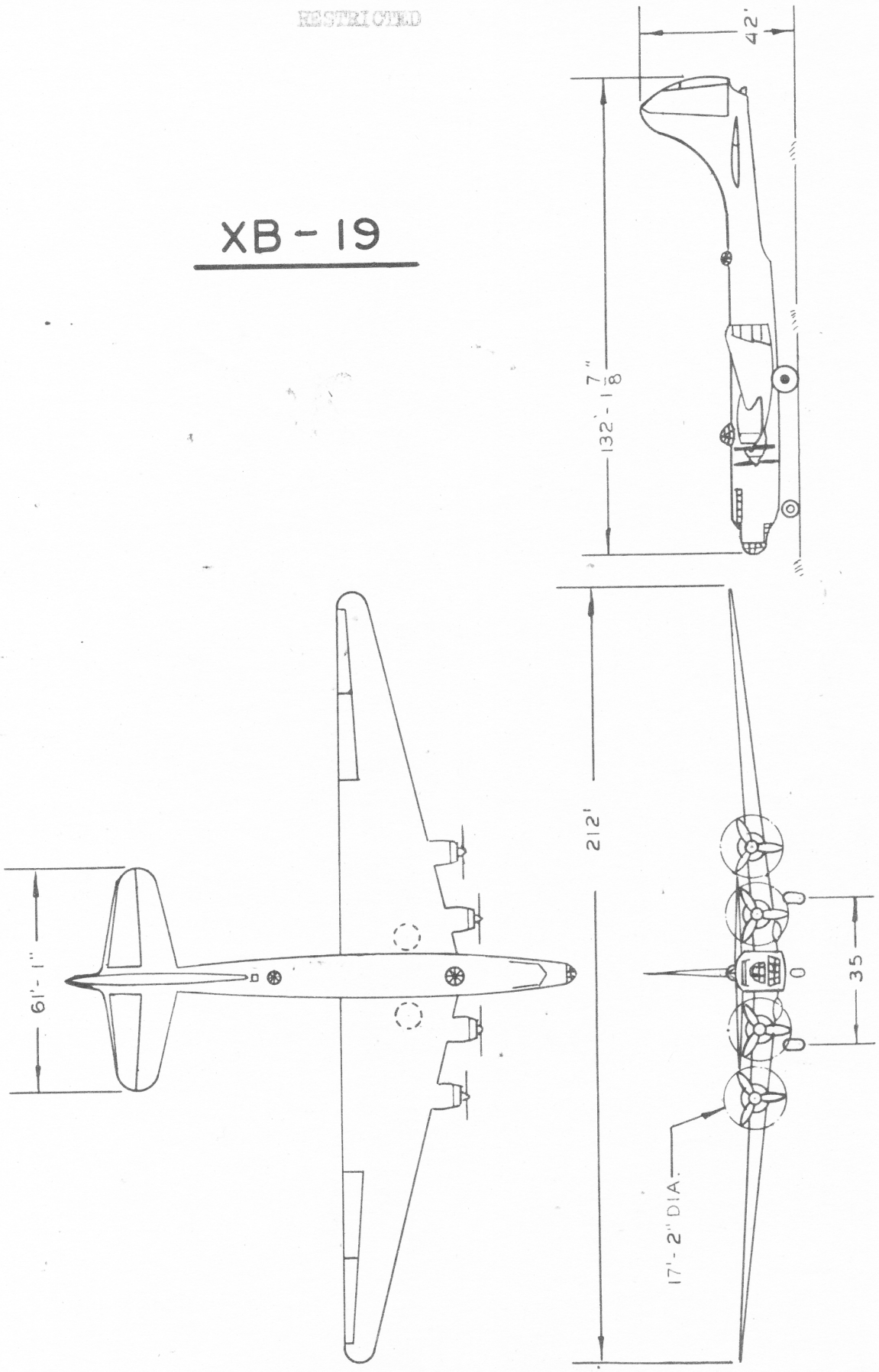
XB-19



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DESCRIPTION OF AIRPLANE

Model XB-19 Mfr. Model Spec. No. DS-1670 A. C. Model Spec. No. X-203
Overall Span 212 Feet Overall Length 132'-4" Overall Height 42 Feet

WINGS

Type Cantilever Stagger — Gap — Aspect ratio 10.5 Total Wing Area 4285 sq. ft.

	Span ft.	Root-Chord inches	Tip-Chord inches	Incidence deg. (T. L.)	Dihedral deg. L. E.	Sweepback deg. L. E.	Area sq. ft.	Airfoil Section
Upper	—							
Mid-	—							
Lower	212'	396"	91.5	6°	6°	13.5	4285	23019-08

HIGH LIFT DEVICES

Type Trailing Edge Travel 50° Span Chord Area 373 sq. ft.

AILERONS

Number 2 Type Double, Aluminum Alloy Frame Location
Balance Area 27.8 % Total Area 410.4 sq. ft. Travel: deg. Up 20 deg. Down 10
Trim Tab Area None sq. ft. deg. Up deg. Dn. Control Tab Area 41.3 sq. ft. deg. Up 20 deg. Dn. 20

MAXIMUM FUSELAGE SECTION

Location Dimensions Area sq. ft. Shape

STABILIZER

Maximum Chord Span 61'-1" Area 531.8 sq. ft. Adjustable No

ELEVATORS

Span 61' Chord Balance Area 25 % Total Area 410.3 sq. ft. Hinge aft LELW
Travel: deg. Up 20° deg. Down 20° Horizontal Tail Area Coefficient
Trim Tab Area 15.8 sq. ft. deg. Up 14.5 deg. Dn 14.5 Control Tab Area 34.3 sq. ft. deg. Up 20 deg. Dn. 20

FIN

Number One Span Chord Area 187.1 sq. ft. Adjustable No.

RUDDER

No. 1 Span Chord Bal. Area 23 % Area 200.4 sq. ft. Hinge aft LELW
Travel: deg. Rt. 20 deg. Lt. 20 Vertical Tail Area Coefficient
Trim Tab Area 7.6 sq. ft. deg. Rt. 14 deg. Lt 14.5 Control Tab Area 21.5 sq. ft. deg. Rt. 20 deg. Lt. 20

ALIGHTING GEAR

Main		Auxiliary
* Type Single Strut	Wheel Base 35'	Type Forked - Single Strut
No. Wheels 2 Size 96"	Tread	Location Nose Size 56"
Retracting System Hydraulic	Brakes Hyd. Disc	Retracting System Hydraulic

REMARKS:

*19" Buffer Wheel at Tail.

Mat. Div. A. C. SB-Wright Field 10-28-39-1M

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DESCRIPTION OF POWER PLANT

Airplane Model XB-19 Number of Main Engines 4 Arrangement Tractor

ENGINE

Manufacturer Wright Mfr. Model Spec. A. C. Designation R-3350-5
Mfg. Spec. No. 537-F A. C. Spec. No. A. C. Approved
Type Air-Cooled Radial - 2-Speed Supercharger
No. Cyl. 18 Bore Stroke Compression Ratio Reduction Gear Ratio 16:9
Supercharger Type 2-Speed Internal Blower Ratios

Rating:	Altitude ft.	Power b. hp.	Speed r. p. m.	Man. Pr. in. Hg.	Time Limit minutes	Blower Ratio	Mixture F/A
Take-off	S. L.	2000	2400	43	5	6.41:1	Rich
Normal	S. L.	1620	2300	34.5	None	6.41:1	.085
Normal	5,700	1700	2300		"	6.41:1	.085
	15,700	1500	2300	33.5	"	8.86:1	.085
Military		2000	2400	43	5		

Magneto Mfr. Bendix Scintilla No./Eng. 2 Spark Plug Mfr. Various No./Eng. 36
Carburetor Mfr. Holley No./Eng. 1 Type 2795B A. C. Setting Fuel 100 octane
Mixture Control Manual Type Air Intake Ram Normal Pressure 7 lbs.
Cooling Air No. Radiators None Type — Total Coolant Capacity — gal.
Temp. Control — Radiator Location — Total Frontal Area — sq. ft.
Intercooler Type None Location — Total Frontal Area — sq. ft.
Type Exhaust System Monel Collector Rings Shrouded
Location of Discharge Top, R.+L. Glare Shielded From None Silencers Yes
Remarks:

LUBRICATION SYSTEM

Capacities, gal.: Normal 240 Maximum 376 No. Tanks 4 Location L.E. Wings - Integral
No. Oil Coolers 4 Location Ducts Below Wings Temp. Control Shutters
Remarks:

FUEL SYSTEM

Capacities, gal.: Normal 8000 Maximum 11,174 Main 10,350 Reserve 0 Aux. 0 Bomb Bay 824
No. Tanks 4 Location and Construction Integral, Between Wing Spars Outboard of Wheel Well.
Remarks:

AUXILIARY POWER PLANT

Description: 2 each installed
Westinghouse units to Specification No. AC-101B
3-phase, 110-volt, A.C.

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Mat. Div. A. C. SC-Wright Field 10-28-39-1M

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DESRIPTION OF ARMAMENT

Airplane Model XB-19 Mfr. Model Spec. DS-167C Date 1-2-39

DESCRIPTION OF ARMAMENT

No.	Type	Cal.	Rds. ea.	Location
2		.30		One in each 37 mm. turret
2		.30		One each side bombardier
2		.30		One each side below stabilizer
1		.50		Tail position
1		.50		Upper rear power turret
1		.50		Lower rear manual turret
2		.50		One each side galley compartment
1		37 mm.		Upper front turret
1		37 mm.		Nose turret

Gun Sight Type and Location: Telescope Sights in Turrets and Tail Position Ring and Bead at Other Positions.

NORMAL BOMBS (Wt. 2500 lbs.)

Sta.	Location	No.	Size	Type	Bomb Bay Tank
A	Bomb Bay	1	2000	M-34	or gals.
B	" "	2	1100		or gals.
C	" "	4	600		or gals.
D	" "	8	300		or gals.
E	" "	20	100		or gals.
F					or gals.

ALTERNATE BOMBS (Max. Wt. 37,107 lbs.)

Sta.	No.	Size	Type	No.	Size	Type	No.	Size	Type	No.	Size	Type
A	8	2000	M-34 or			or			or			
B	16	1100	or			or			or			
C	30	600	or	30	300	or	30	100	or			
D			or			or			or			
Wing (E	10	2000	M-34 or	10	1100	or	10	600	or	10	300	
Racks(F	10	100	or			or			or			

Bomb Sight Type and Location:

CHEMICALS (Smoke)

Type Tank No Provisions

Amount

Location

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Mat. Div. A. C. 8D-Wright Field 10-28-39-1M RESTRICTED

DESCRIPTION OF EQUIPMENT

Airplane Model XB-19 Mfr. Model Spec. DS-167C Date 1-2-39

PYROTECHNICS

Item	Service No.	Service Location	Service Type	Spares Normal	Spares Alternate
Flares	12	Nose Compartment	M-8	4 in Cans	8 - Stowed
Signal	76	Main Cabin	M-9, M-10, M-11 and X-1C	76	76

PHOTOGRAPHIC

Normal Type and Location: T-3A, Below Hatch in Crew Compartment

Alternate Type and Location:

RADIO - After Modernization at Wright Field

Interphone	Amplifier BC-347
Radio Compass	SCR-269-C
Marker Beacon	BC-357-C
Liaison	SCR-274-N and Bendix Rec. RA10DA
Command	SCR-287

NAVIGATION

Automatic Pilot	AFCE
Drift Meter	B-3

MISCELLANEOUS

Oxygen	Low Pressure, Demand System
Type of Ice Elimination	Goodrich Rubber Company Equipment on All Leading Edges
Type of Life Raft	2 Each Raft, Type A-2, Stowed in Rear Compartment Below Emergency Exit
Type of Flotation	None

Crew Stations, Total:
~~XXXXXXXXXXXXXXXX~~

Nose Compartment - Turret Operator, Bombardier, Side Gunner.
Main Cabin - Pilot, Co-Pilot, Commander, Navigator, Engineer, Radio Operator.
Center Compartment - Upper Main Turret Gunner.
Crew Compartment - Two Flight Mechanics and/or Relief Crew.
(Note: 8 Seats and 6 Bunks in This Compartment.)
Galley Compartment - Two Side Gunners, Two Rear Turret Gunners (U+L).
Tail Compartment - Tail Gunner, Tail Side Gunner.
Total Active Stations - 16; Emergency Stations - 2 Mechanics.

Mat. Div. A. C. 129a-Wright Field 10-28-39-1M

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OFFICIAL PERFORMANCE SUMMARY

Model XB-19, AAF No. 38-471 Date of issue June 20, 1942

1. Level Flight Speeds at Design Altitude of 15,700 ft. with Design Gross Weight of 140,000 lb.

Maximum Speed 204 (224) m. p. h. at 2300 r. p. m. with 1500 b. hp. (100 % rated)
High Speed m. p. h. at r. p. m. with b. hp. (% rated)
Operating Speed 165 (186) m. p. h. at 2100 r. p. m. with b. hp. (75 % rated)
S.L. Cruising Speed 120 (135) m. p. h. at r. p. m. with b. hp. (% rated)

2. Optimum Range and Endurance with 11,174 gal fuel and 2500 lb. bombs.

At High Speed miles at mi./gal. or hrs. at gal./hr. (s. f. c.)
At Operating Speed 5200 miles at mi./gal. or hrs. at gal./hr. (s. f. c.)
At Cruising Speed 7710 miles at mi./gal. or 54.7 hrs. at gal./hr. (s. f. c.)

3. Practical Range and Endurance with 11,174 gal. fuel and 2500 lb. bombs.

At Operating Speed miles at mi./gal. or hrs. at gal./hr. (s. f. c.)
At Cruising Speed miles at mi./gal. or hrs. at gal./hr. (s. f. c.)
Limited by engine cooling. Maximum endurance 55.4 hours at S.L.

4. Climb Data with Gross Weight of 114,000 lb.

Standard Altitude ft.	S.L.	S.L.	S.L.	10,000			
VI- Climbing Speed m. p. h.	128	127	125	136			
Engine Speed r. p. m.	2400	2300	2300	2300			
Total Power b. hp.	7500	6800	5000	6800			
Maximum Rate f. p. m.	650	575	225	200			
Minimum Time min.							

5. Ceiling: Normal Engine Operation: Service Ceiling 23,000 ft. Absolute Ceiling 24,500 ft.

6. Take-off and Landing Distances—To Clear 50 ft. Obstacle at Sea Level (no wind).

Take-off 4405 ft. at 105 m. p. h. 0 deg. flap. Gr. Wt 140,000 lb. Ground run ft.
Land 1785 ft. at 73 m. p. h. Full deg. flap. Gr. Wt 114,000 lb. Ground run ft.

7. References and Remarks:

Range data too complex for presentation here. See Report No. SM3544, Range Investigation of XB-19 Airplane. Also see Report No. 3602, Performance Analysis.

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Mat Div. A.C. 292- W.P.D. 11-5M

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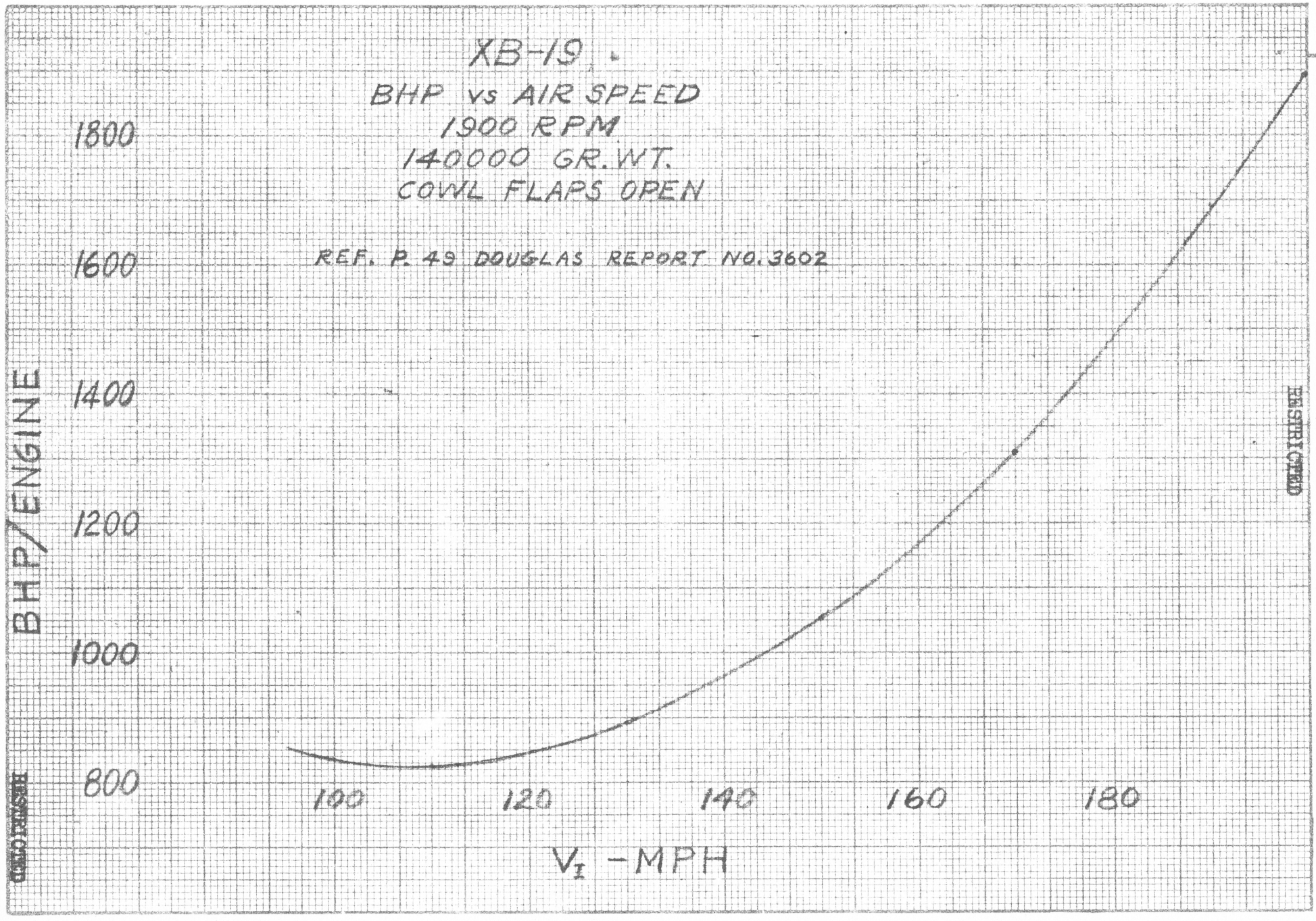

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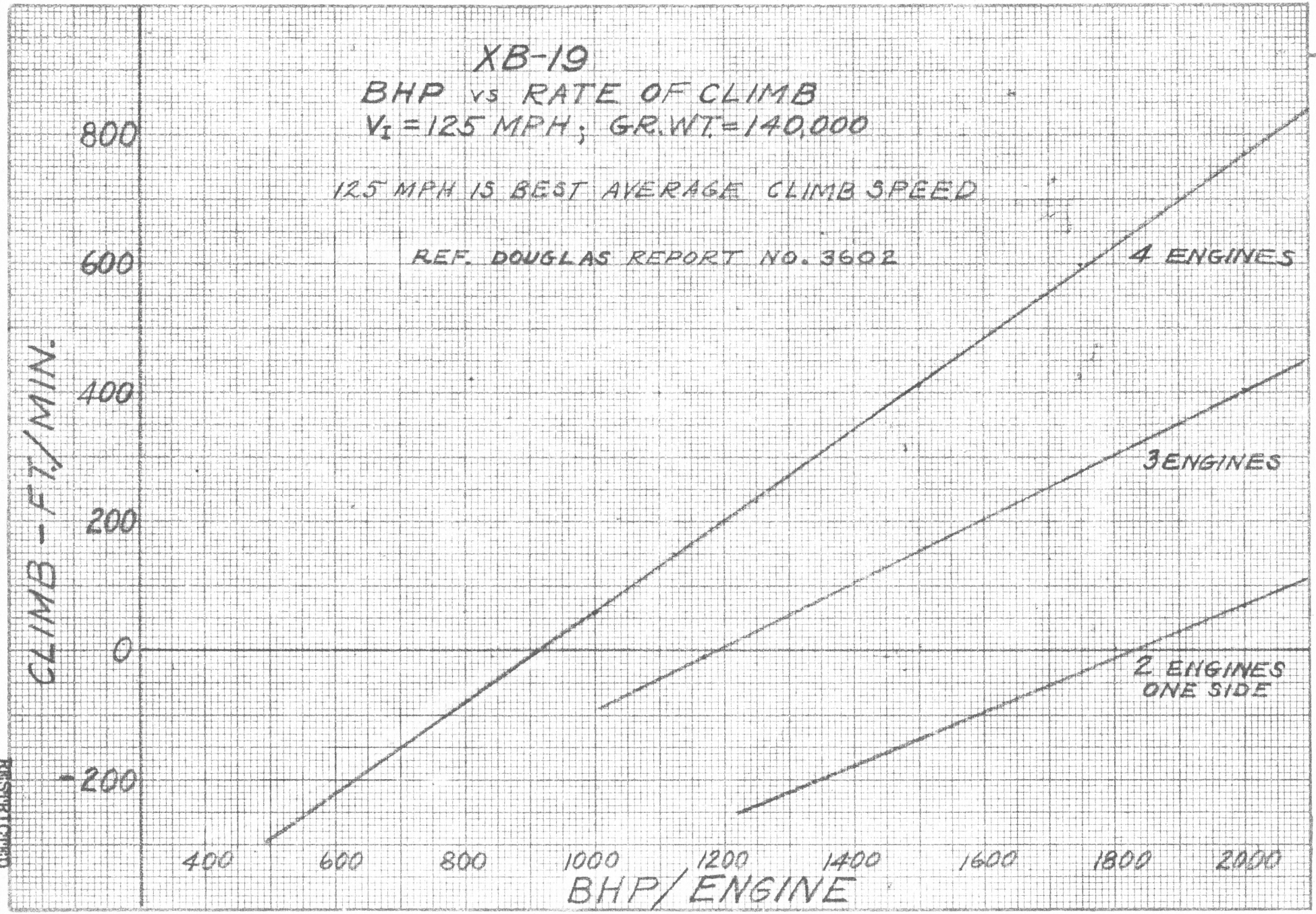

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RESULTS AND DISCUSSION:

As a result of 689 Inspection and flight tests at the contractor's plant, the airplane was accepted as to workmanship and conformity with requirements and good practice.

Flight tests conducted by the manufacturer and the Army Air Forces established the following:

	Guarantee	Cowl Flaps	Actual Open	Actual Closed
High speed, M.P.H.	210		204	224
Operating speed, M.P.H.	186		165	186
Cruising speed, M.P.H.	140		*120	*135
Take-off over 50' obstacle, feet	4,480		4,405	-
Landing over 50' obstacle, feet	2,210		1,785	-
Service ceiling, feet	22,200		23,000	-
Range (maximum), miles	7,750		6,840	7,710
Endurance at cruising speed (hours)	42		**34	**40

* Constant speed for 42-hour endurance gives range of 5,040 miles and 5,660 respectively.

**Endurances of 34 and 40 hours at 140 M.P.H. give ranges of 4,760 miles and 5,600 respectively.

Due to cooling deficiencies of the R-3350-5 engines, impracticable to correct, the above performances - for guarantee purposes - do not represent the practical values to which the airplane is limited. See Douglas Aircraft Company Report No. 3602, Performance Analysis of the XB-19 Airplane, dated April 13, 1942, for complete information; also, Inter-Office Memorandum dated March 14, 1942, to Chief, Materiel Division, HGB:AW:50, Subject: XB-19 Airplane - Operational Limitations.

The XB-19 airplane has excellent flying qualities and the stability-control combination is satisfactory. The airplane is directionally and laterally stable and has approximately neutral stability longitudinally. Slight spiral instability exists but in this respect it is better than